

A NEW CRAWFISH OF THE GENUS *ORCONNECTES*
FROM EAST-CENTRAL MISSISSIPPI AND
ADJACENT ALABAMA
(CRUSTACEA: DECAPODA: CAMBARIDAE)

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Abstract.—The crawfish *Orconectes (Gremicambarus) jonesi* is described from the Sucarnoochee River drainage in Mississippi and Alabama. Of the members of the subgenus that occur nearby, it is most closely related to *O. (G.) mississippiensis* (Faxon) and *O. (G.) chickasawae* Cooper & Hobbs. It may be distinguished from them by its wider areola, the possession of marginal rostral spines, strong cervical spines, and longer terminal elements of the first pleopod of the male.

Cooper & Hobbs (1980:1) remarked that the members of the “*virilis* section” (=subgenus *Gremicambarus* Fitzpatrick, 1987) of the genus *Orconectes* in the Mobile River basin were badly in need of clarification of identity. They further noted that because of the extreme similarity of morphology, a large series of specimens with numerous first form males is essential for correct identification of the several populations. Fortunately, a recent survey of the Sucarnoochee River drainage in east-central Mississippi and adjacent Alabama provided such a series, allowed the recognition of a distinct species therein, and provided sufficient material to permit the description that follows. Both conventional standards of length are given: total carapace length (TCL) and postorbital carapace length (POCL).

Orconectes (Gremicambarus) jonesi,
new species

Fig. 1

Orconectes: Fitzpatrick & Buchanan, 1992:
65.

Diagnosis.—Body and eyes pigmented. Rostrum lacking median carina, usually with moderately thickened, slightly converging margins terminating cephalically in acute

spines; distinctly acuminate. Areola 27.44 to 33.50% (\bar{X} 29.86%) of total carapace length 37.09 to 44.50% (\bar{X} 40.32%) of postorbital carapace length; 2.06 to 4.05 (\bar{X} 3.32) times longer than wide, and with 3 to 6 punctations in narrowest part. Single cervical spine prominent; suborbital angle very weak or obsolete; branchiostegal spine small but prominent; postorbital ridges prominent and terminating cephalically in spine. Antennal scale 1.77 to 2.59 (\bar{X} 2.17) times longer than wide; widest proximal to mid-length. Chela depressed, mesial margin of palm with 1 or 2 rows of spiniform tubercles, latter more numerous on more mesial row; fingers only slightly gaping; males lacking tuft of setae at base of opposable margin of immovable finger, but females often with small tuft in basal $\frac{1}{4}$; mesial margin of dactyl with sparse row of subacute tubercles in basal half, if extending onto distal half then tubercles subsquamous; opposable margin of dactyl with shallow excision. Hook on ischium of third pereopod of male; third and fourth basipodites without boss or eminence. First pleopod of first form male lacking angular shoulder on cephalic margin, rami curved throughout length, and central projection reaching nearly to cephalic margin of coxae of second pereopods

when abdomen flexed; pleopod length divisible into carapace length 2.43 to 3.58 (\bar{X} 2.76) times; terminal elements slender, subparallel, but widely separated from base; central projection 24.32 to 42.67% (\bar{X} 32.02%) of mesial length of pleopod, blade-like, tapering evenly to acute tip which deflected mesially to cross tip of central projection of other side, not extending so far caudally as mesial process; mesial process subcylindrical in basal $\frac{2}{3}$ and subspatulate in distal $\frac{1}{3}$. Annulus ventralis of female subrhomboid, wider than long, with deep trough in cephalic half overhung by high cephalo-median eminence on one side and scarcely so by another at midlength of annulus on other side; sinus originating under lesser overhang and moving nearly straight almost to caudal margin of annulus; first pleopods small, usually reaching midlength of annulus when abdomen flexed.

Holotypic male, Form I. — Eyes large and multifaceted; body pigmented; cephalothorax (Fig. 1c, f) subcylindrical in cross section; abdomen narrower than carapace (9.4 and 9.9 mm, respectively); width of latter less than depth at caudal margin of cervical groove (9.3 and 10.4 mm). Areola 29.1% of TCL (40.6% of POCL), 2.9 times longer than wide and with 4 or 5 punctations in narrowest part. Rostrum with slightly thickened elevated margins terminating in strong upturned spines; rostrum very slightly depressed, upper surface only slightly excavated; acumen prominent and slightly upturned at apex, reaching nearly to distal margin of peduncle of antenna and just beyond distal article of peduncle of antennule. Subrostral ridges weak, visible in dorsal aspect only at base of rostrum. Postorbital ridges strong, terminating cephalically in strong, laterally deflected spine. Suborbital angle nearly absent. Carapace studded dorsally with shallow setiferous punctations except in dorsal gastric region, hepatic region studded with squamous tubercles, those of left side sufficiently developed to give undulant appearance from dorsal aspect; ce-

phalic region of branchiostegite with numerous squamous tubercles (Fig. 1c). Branchiostegal spine small but prominent. Cephalic portion of epistome (Fig. 1k) broader than long; apex markedly truncate and with tubercular thickened margin; moderately deep fovea in main body; epistomal zygoma unremarkable.

Abdomen slightly narrower than carapace (widths 10.4, 10.9 mm, respectively), and slightly longer (lengths 25.8, 24.0 mm, respectively). Pleura of second segment markedly larger than those of other segments, overlapping that of first segment and ending caudoventrally in subacute angle; pleura of third segment less angular and those of subsequent segments evenly rounded caudally. Telson with 2 acute spines in each caudolateral corner of cephalic section, mesial ones slightly movable; caudal section evenly rounded distally with hirsute margin. Basal podomere of uropods with short stout spine on distal margin of each lobe; both rami with stout median keel terminating subdistally in stout spine not overreaching caudal margin; outer ramus divided transversely by usual denticulate suture.

Antennules of usual form, basal article of peduncle with spine on ventral surface slightly distal to midlength. Antennal flagellum reaching to anterior margin of third abdominal segment. Antennal scale (Fig. 1h) 2.1 times longer than wide, with greatest width proximal to midlength; mesial margin angular; apical spine strong and reaching slightly beyond ultimate podomere of peduncle of flagellum of antenna.

Right chela (Fig. 1l) subovate in cross section, somewhat depressed. Inner margin of palm with row of 6 low spiniform tubercles (7 on left) and vaguely defined row of 5 low squamous tubercles more dorsolaterally placed; entire dorsal surface studded with setiferous punctations. Fingers slightly gaping basally; excision on movable finger shallow. Immobile finger with conspicuous median ridges above and below, dorsal one flanked by deep setiferous punctations; with

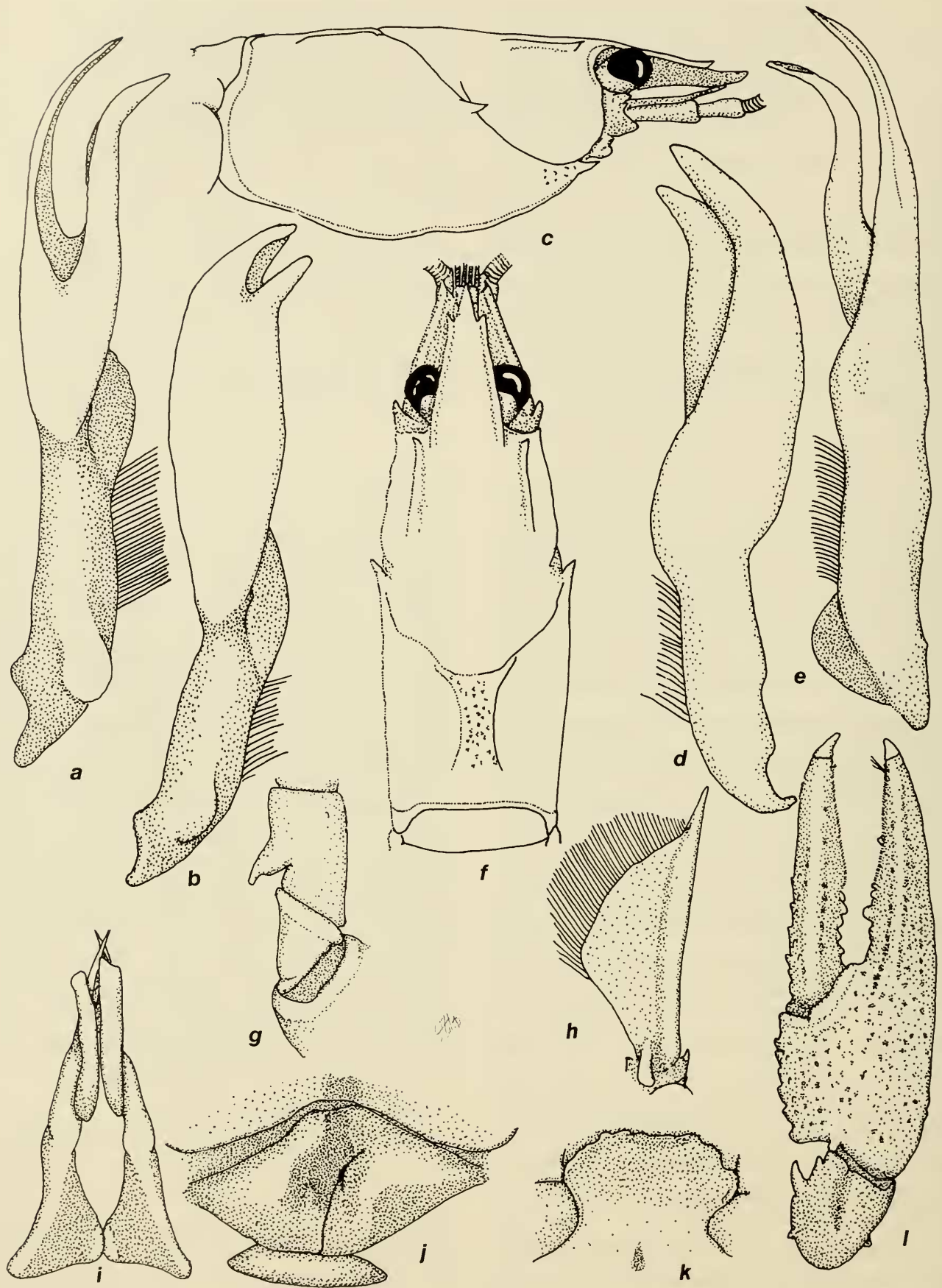


Fig. 1. *Orconectes (Gremicambarus) jonesi*, new species. (All from holotype, except b and d from morphotype, j from allotype.) a, b, mesial view of first pleopod; c, lateral view of carapace; d, e, lateral view of first pleopod; f, dorsal view of carapace; g, proximal podomeres of third pereiopod; h, antennal scale; i, caudal view of first pleopods; j, annulus ventralis and adjacent sclerites; k, anterior of epistome; l, distal podomeres of chela.

rounded costate outer margin and deep submarginal punctations in basal half; opposable margin with row of 5 prominent tubercles (third from base clearly largest) in basal half and band of crowded minute denticles in distal half; band of denticles flanked below by prominent tubercle near base of distal third of finger. Movable finger with less prominent median ridges and dorsal flanking punctations conspicuous on mesial side only; mesial margin with row of 6 spiniform tubercles in basal half, flanked dorsally by irregular row of 5 squamous tubercles; opposable margin with 5 prominent tubercles (penultimate most prominent) in basal half and band of minute denticles in distal half. Carpus about 1.4 times longer than broad, less punctate dorsally than chela, and with shallow submedian fovea in distal $\frac{2}{3}$; mesial margin with strong spike-like tubercle flanked proximally by low, rounded tubercle (lacking on left carpus) just distal to midlength and strong rounded tubercle placed subdistally; strong spiniform tubercle in ventral mesiodistal corner and less developed tubercle in ventral laterodistal corner. Dorsal surface of merus with 2 submarginal dorsodistal acute spines; lower mesial margin with row of 9 small acute spines, distalmost strong; lower lateral margin with row of 4 strong acute spines. Ischium with single tubercle on ventromesial margin. Ischium of only third pereopod with simple hook (Fig. 1g); hook strong and overreaching distal margin of corresponding basis but not opposed by tubercle. No prominent bosses on coxae of pereopods.

First pleopods (Fig. 1a, e, i) symmetrical and as described in "Diagnosis," reaching coxae of second pereopods when abdomen flexed. Apices of mesial processes distinctly truncate from caudal aspect.

Allotypic female.—Except for secondary sexual characteristics, differing from holotype in following respects: apex of rostrum reaching just to distal margin of distal article of basal peduncle of antennule; areola with only 3 or 4 punctations in narrowest part

Table 1.—Measurements (mm) of primary types of *Orconectes (Gremicambarus) jonesi*, new species.

	Holo-type	Allo-type	Morpho-type
Carapace			
Total length	23.0	25.0	21.7
Postorbital length	16.5	18.6	15.5
Height	10.3	11.0	9.8
Width	9.9	8.8	7.4
Areola			
Length	7.8	6.8	5.6
Width	2.3	2.6	1.6
Rostrum			
Length	8.1	8.8	7.4
Width	4.9	4.4	3.6
Chela			
Length of mesial margin of palm	5.7	4.6	4.5
Width of palm	6.5	5.0	4.5
Length of lateral margin	18.7	13.9	13.6
Length of dactyl	11.6	8.2	8.8
Abdomen			
Length	24.8	27.7	23.4
Width	9.4	12.0	7.8

and somewhat narrower and shorter (see Table 1); distal margin of cephalic lobe of epistome more evenly rounded but still wider than long. Antennal flagellum reaching middle of third abdominal segment. Mesial margin of right chela with row of 6 spiniform tubercles and 2 low tubercles just dorsolateral to it (7 small spiniform tubercles and 3, respectively, on left); mesial margin of dactyl with 1 low spiniform tubercle followed by 2 squamous tubercles and lacking dorsolateral tubercles (all 3 tubercles low spiniform on left); inferior mesial margin of merus with row of 3 tubercles followed by 5 small spiniform ones proximal to large distal spine, inferior lateral margin with 1 distal spine (left with 10 small spiniform tubercles followed by distal spine ventromesially, and 2 distally placed spines ventrolaterally).

Annulus ventralis (Fig. 1j) fused firmly to sternum along cephalic margin, subrhom-

boid in outline, about twice as wide as long; with deep submedian trough in cephalic half communicating with broadly ovate sulcus located in middle of annulus; right cephalolateral tubercle much elevated (ventrally) partially to overhang caudalmost part of trough and sulcus; sinus originating beneath slight median overhang of left cephalolateral tubercle nearly at midline and moving sharply caudad to traverse nearly straight line to caudal margin. Postannular plate about 3.5 times wider than long and deepest near midpoint of plate. First pleopods well developed and overlying ventral surface of annulus when abdomen flexed.

Morphotypic male, Form II.—Differing from holotype in minor respects, mostly in spiniform ornamentation of cheliped, which is more like allotype. Antennal flagellum reaching middle of third abdominal segment. First pleopod reaching only to coxae of third pereopods; both terminal elements non-corneous, blunter and shorter than in holotype (Fig. 1b, d).

Type locality.—Pawticfaw Creek at unnumbered hard-surfaced road, 3.1 mi (5.0 km) SSE of State Route 39; T10N, R16E, sec. 27/34, Kemper County, Mississippi. The creek here was 1 m deep and up to 10 m wide; a moderately swift current flowed over a firm sand bottom that supported dense beds of *Sparganium*. The adjacent shore was dominated by stands of *Acer* and *Liquidambar*, with a conspicuous undergrowth of *Rubus*. The only other crawfish collected at this site was *Procambarus (Pen-nides) lagniappe* Black, 1968.

Disposition of types.—The holotypic male, Form I, the allotypic female, and the morphotypic male, Form II, are deposited in the National Museum of Natural History, Smithsonian Institution (USNM 220701, 220702, and 220703, respectively, as is a paratypic series (3 ♂I, 1 ♂II, 4 ♀, 2 ♂j, 3 ♀j). Other paratypes are located at the Museum of Natural History, University of Alabama, Tuscaloosa (UADC) (5 ♂I, 3 ♂II, 12 ♀, 5 ♂j, 9 ♀j), the Mississippi Museum of Natural

Sciences, Jackson (MMNS) (3 ♂I, 4 ♂II, 6 ♀, 3 ♂j, 4 ♀j), Tulane University Museum of Natural History, Belle Chasse, Louisiana (TU) (3 ♂I, 5 ♂II, 8 ♀, 3 ♂j, 8 ♀j), and Tadashi Kawai, Ebetsu City, Hokkaido, Japan (1 ♂II, 1 ♀).

Range and material examined.—Presently the species is known only from the Sucarnoochee River drainage. Very similar forms occur in the upper reaches of the Chickasawhay and Leaf river drainages, and the tributaries of the east bank of the lower Tombigbee River are inhabited by an allied form. Until more material from these areas is available for comparison, they are tentatively assigned to this species, and the paratypes are confined to those from the Sucarnoochee (below). The Noxubee River drainage and northward are populated by *Orconectes (G.) chickasawae* Cooper & Hobbs (1980) and *O. (G.) mississippiensis* (Faxon, 1884).

Alabama—Sumter Co.: (1) Alamuchee Ck at St Rte 13, 3.8 mi (6.1 km) S of Livingston (jct. US Hwy 11), T17N, R2W, NE/4 sec 21, 1 ♀j, 22 Jun 1990, colls.: James V. Buchanan, J. F. Fitzpatrick, Jr., (UADC 147.01); (2) Alamuchee Ck at U.S. Hwy 80, 4.5 mi (7.2 km) W of Scratch Hill (jct. St Rte 17), T17N, R4W, NE/4 sec 24, 5 ♂j, 6 ♀j, 22 Jun 1990, JVB, JFF (UADC 148.01).

Mississippi—Kemper Co.: (3) type locality, 6 ♂I, 2 ♂II, 9 ♀, 2 ♂j, 3 ♀j, 26 Oct 1990, JVB, JFF (types, plus USNM 220704; UADC 150.01); (4) stream trib to Pawtick-faw Ck, 9.3 mi (15.0 km) N of Lauderdale Co. line on St Rte 39, T10N, R11E, SW/4 sec 16, 1 ♂I, 26 Jan 1990, JVB, JFF (MMNS 750); (5) Sucarnoochee Ck at Kelli's Store-Linville Rd, 1.8 mi (2.9 km) W St Rte 39, T11N, R16E, center sec 7, 1 ♂II, 27 Jan 1990, JVB, JFF (MMNS 751); (6) trib to Sucarnoochee Ck at St Rte 39, 4.7 mi (7.6 km) N of DeKalb (jct. St Rte 10), T11N, R16E, NE/4 NE/4 sec 4, 1 ♂I, 27 Jan 1990, JVB, JFF (MMNS 752); (7) trib to Sucarnoochee Ck 3.9 mi (6.3 km) S of Noxubee Co. line on St Rte 39, 0.9 mi NW on co.

rd., T12N, R16E, NW/4 sec 21, 2 ♀j, 27 Jan 1990, JVB, JFF (MMNS 753); (8) Pawtickfaw Ck at St Rte 39, 7.8 mi (12.6 km) N of Lauderdale Co. line, T10N, R16E, sec 28/29, 1 ♂II, 1 ♀, 06 Apr 1990, JVB, Lisa L. White, JFF (Kawai); (9) Creek trib to Sucarnoochee River, 7.6 mi (12.2 km) N of DeKalb (jct. St Rte 16), 0.6 mi (1.0 km) W of St Rte 39 on co. rd., T12N, R16E, NW/4 sec 21, 2 ♂II, 6 ♀, 06 Apr 1990, JVB, LLW, JFF (MMNS 754); (10) trib to Sucarnoochee Ck at St Rte 387, 9.6 mi (15.4 km) SE of Preston (jct. St Rte 21), T11N, R15E, SW/4 sec 24, 3 ♂II, 8 ♀, 06 Apr 1990, JVB, LLW, JFF (UADC 146.01); (11) trib Pawtickfaw Ck at paved road, 5.1 mi (8.2 km) E of Moscow, T10N, R15E, SW/4 sec 1, 2 ♀, 3 ♂j, 6 ♀j, 21 Jun 1990, JVB, JFF (TU 6440); (12) Sucarnoochee R at St Rte 16, 3.2 mi (5.1 km) E of DeKalb (jct. St Rte 39), T11N, R17E, SW/4 sec 19, 1 ♀j, 23 Jun 1990, JVB, JFF (MMNS 756); (13) trib Pawtickfaw Ck at US Hwy 45, 4.7 mi (7.6 km) N of Lauderdale Co. line, 0.2 mi (0.1 km) W on dirt rd, T9N, R18E, SW/4 sec 7, 1 ♀j, 07 Jun 1990, J. M. Boyle, JVB (MMNS 757); (14) Straight Ck at hard-surfaced rd, 6.1 mi (9.8 km) W of US Hwy 45, T10N, R17E, sec 9/16, 3 ♂I, 26 Oct 1990, JVB, JFF (UADC 149.01); Lauderdale Co.: (15) Big Reed Ck at US Hwy 45, 15.3 mi (24.6 km) N jct US Hwy I20/I59, 1.9 mi (3.1 km) S of Kemper Co. line, T8N, R17E, NE/4 NE/4 sec 12, 4 ♂II, 4 ♀, 04 Apr 1990, JVB, JFF (TU 6439); 3 ♂I, 1 ♂II, 2 ♀, 2 ♀j, 27 Oct 1990, JVB, JFF (TU 6441); (16) Ponta Ck at St Rte 39, 12.2 mi (19.6 km) N of Meridian (jct. US Hwy I20/I59), T8N, R16E, NE/4 sec 21, 1 ♂j, 22 Jun 1990, JVB, JFF (MMNS 755); (17) Ponta Ck, 2.1 mi (3.4 km) ESE of entrance to Meridian Naval Air Station on hard-surface rd, T8N, R17E, SW/4 NW/4 sec 22, 1 ♂I, 1 ♂II, 2 ♀, 27 Oct 1990, JVB, JFF (MMNS 758).

Variations.—Most of the variation seen was in the nature and development of the various spinose and tubercular ornamentation, especially of the chelipeds. The me-

sial margin of the palm had from one to seven spiniform tubercles, the most common number being five (35% of specimens examined) followed closely by six and four; the more dorsal row of squamous tubercles varied from zero to seven, with zero and two being subequal in frequency (22% of specimens); four first form males and one female exhibited tubercles below the mesialmost row, the maximum (in two animals) being three. Comparable variation in the tubercular ornamentation of the dactyl occurred. The merus likewise varied in the number of spines along the lower surfaces: lateral one to four and mesial two to 11. The number of punctations in the narrowest part of the areola were 3–4 (13.5% of specimens), 4–5 (29.7%), 5–6 (45.9%), or 6–7 (10.9%); these figures are markedly greater than those for *O. chickasawae*.

Next most variable was the epistome. The cephalic margin frequently was broadly rounded, and almost as often broadly truncate; the ratio of length to width, however, remained near 1.2.

I did not encounter a single female in which the annulus was the reverse image of the allotype, although dextral variations probably exist. And as one can expect, juvenile specimens often were devoid of the spines or tubercles on the chelipeds that distinguish adult specimens.

Size.—The largest animal, a first form male, was taken 27 Jan 1990 from a tributary to Sucarnoochee Creek, 4.7 mi (7.6 km) south of DeKalb on St. Rte. 39, and it measured 29.2 mm TCL (POCL 21.2 mm); the smallest Form I male was 18.5 mm TCL (POCL 13.6 mm). The largest second form male and female were 29.0 (POCL 21.3) and 30.0 (POCL 22.6) mm, respectively. There was no apparent correlation of size with any portion of the drainage.

Based on the type series, *O. jonesi* seems to be somewhat smaller than either *O. chickasawae* or *O. mississippiensis* (see size reports in Cooper & Hobbs, 1980:34, 41).

Life history notes.—The breeding period

seems to begin in what, for the latitude, is early fall (October), with ovigerous females appearing in late winter (January). In October, 1990, the male : female ratio was 1.42, and 76% of the males were Form I. By January, the dominance of Form I males persisted, but female numbers fell sharply. This would be consistent with ovigerous females being more secretive and thus less likely to be in open water, a phenomenon documented for other species of crawfishes. By summer, juveniles dominate the populations, but by fall their numbers decline to about 20%, a status they maintain throughout the winter. These probably represent a reserve breeding stock in the event that the usual reproductive season should fail. These possibilities were dramatized just before the study period, when torrential rains in late 1989 were very destructive to the habitat and the summer of 1990 was unusually dry in the local geographic area.

Relationships.—*Orconectes* (*Gremicambarus*) *jonesi* is a member of the species complex allied to *O. (G.) chickasawae* and *O. (G.) mississippiensis* (Faxon, 1884). These were discussed at some length by Cooper & Hobbs (1980:34–35), so that here it seems adequate to distinguish *O. jonesi* only from its geographically proximate relatives. In *O. mississippiensis* the areola is obliterated for at least a part of its length. Although open, the areola of *O. chickasawae* has room for at most one punctation in its narrowest part. In contrast, *O. jonesi* has a minimum of three punctations in this area, which is markedly wider (*O. chickasawae* is at least 16 times longer than wide, compared with a maximum value of 4.05 in *O. jonesi*). Quite significant is the relative length of the central projection (the “split” of the pleopod of the writers of a century ago). In *O. jonesi* Form I males this value averages 32.02% of the total length of the appendage, whereas in *O. chickasawae* it averages 21.9% with a maximum length of 26.4%, scarcely overlapping the minimum length (24.3%) of *O. jonesi*. In length of the central projection,

O. jonesi more closely approaches *O. mississippiensis* (31.5–35.6% of pleopod length), but the open areola, length of rostral marginal spines, and a less sharply recurved apex of the central projection will serve to distinguish *O. jonesi* from the latter species. In many respects, *O. jonesi* is more like *O. (G.) etnieri* Bouchard and Bouchard (1976), but the latter species has a sharply recurved apex of the central projection and is apparently confined to tributaries of the east bank of the central portion of the Mississippi River.

Numerous populations of similar *Orconectes* occur in the Yazoo and Big Black drainages in Mississippi. There are inadequate series, especially of first form males, to allow determinations of the relationships of these to *O. etnieri* and *O. jonesi*. Also the upper Chickasawhay and upper Leaf river basins, as well as tributaries of the central east-bank Tombigbee watershed, are occupied by populations of *Orconectes* closely allied to *O. jonesi* and *O. chickasawae*. Again, they are not adequately represented in collections to permit speculation concerning their position in this complex of *Gremicambarus* species.

The differences in habitat requirements for *O. chickasawae*, *O. (G.) holti* Cooper & Hobbs (1980), *O. mississippiensis*, and *O. jonesi* are striking. The former three species seem to prefer sluggish to moderately flowing streams, sometimes occurring in ditches. On only two occasions (at localities 11 and 16 under “Range”) were adult *O. jonesi* collected from other than moderately to swiftly flowing waters; never was it encountered in a ditch. Indeed, usually *O. jonesi* dominated the riffle areas and *Sparganium* beds where it occurred.

Crawfish associates.—In the Sucarnoochee basin the following species were from habitats containing *O. jonesi*: *Cambarus* (*Depressicambarus*) *striatus* Hay, 1902, *C. (Lacunicambarus)* *ludovicianus* Faxon, 1884, *Procambarus* (*Ortmannicus*) *acutissimus* (Girard, 1852), *P. (O.) acutus* (Girard, 1852), and *P. (Pennides)* *lagniappe*. In one

instance (at locality 12, above), a juvenile assignable to *Gremicambarus* was collected; it has an obliterated areola and thus is tentatively assigned to *O. mississippiensis*, but it is the only record of the species from south of the Noxubee River drainage.

Etymology.—It pleases me to be able to name this species in honor of Robert L. Jones, Curator of Invertebrates at the Mississippi Museum of Natural Science and formerly biologist with the Mississippi Natural Heritage Program. His strenuous efforts in the field have contributed much to our knowledge of Mississippi crawfishes.

Acknowledgments

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